

Carbohydrates:

A-preparations

The separation of carbohydrates from other plant components is generally carried out using some kind of extraction or clean-up steps :

A- **Extraction of monosaccharide's** : **one part** of the fresh plants materials is homogenized and mixed with **4 parts of distilled water for about 15 min** and then followed by filtration. After filtration the filtrate is concentrated to a bout ten times at vacuum and allowed to crystalized in refrigerator

B- **Extraction of oligosaccharides** : **one part** of the fresh plants materials is homogenized and mixed with **6-8 parts of distilled water at 90 C for about 15 min** and then filter the solution with celite while hot and after filtration the filtrate is concentrated to a bout ten times at vacuum and allowed to crystalized in refrigerator

C- Extraction of polysaccharides :

a- the plant material is treated with **ethanol** . The filtered residue is collected and treated with a mixture of **ether and benzoic acid**. Then filtered and collected and treated with **1% NaCl** solution and filtered and collect . alkalization of the last filtrate is occurred by **0.5% of ammonium oxalate**

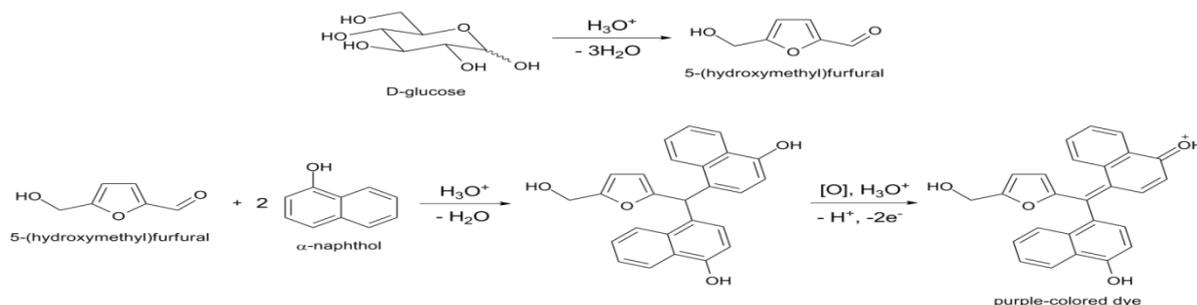
b- the final product is treated with **1% NaCl at 70 c** for about 1 hour and filtration again.

c- The filtrate is treated with **7-12% NaOH for 24** hour and the filtrate is exposed to **acidification** by HCL

d- finally the purified is **precipitate with ethanol**.

B-Identification:

A- Molisch test: The mixture is dehydrated by mixing with H_2SO_4 or HCl to produce aldehyde and then condense with naphthol at which a purple colored ring will be produced in the container



B- Fehling solution : It is generally used for reducing sugars and composed of two solutions, which are mixed together. Fehling solution A composed of 0.5% of **copper sulphate** whereas Fehling solution B composed of **Sodium-Potassium Tartarate**. the carbohydrate will be mixed with equal quantity of Fehling solution and boiling for **10 -15 minute** to produce the **reddish brown coloured precipitate** due to formation of **Cuprous oxide**

C- Osazone formation test: test was developed to identify **aldose sugars** to recognize the alpha-carbon. These sugars react with **2, 4-dinitro-phenyl hydrazine and sodium acetate and acetic acid** effecting only alpha-carbon sugar with formation of **pink-red coloured bis-phenylhydrazone**, known as an osazone.

D- resorcinol test : This test is used for identification of keto-hexoses or to distinguish between ketoses and aldoses. To 1 ml aqueous solution of solution , 5 ml of resorcinol reagent (resorcinol in 6M HCl) was added and boiled. Formation of **cherry red colour** in presence of ketose (Fructose) due to formation of **hydroxyl methyl furfural**.

A- **Charring test:** Carbohydrates on heating in test tube or in presence of Conc. H_2SO_4 , produces charring **تفحم** with smell like burning sugar.

B- **Iodine test:** It is specific for polysacchrides. Few drops of Iodine solution was added to aqueous solution of polysaccharide. Formation of blue colour, **which disappears on heating and reappears on cooling**, indicates the presence of **starch**.

C- **Barford test:** This test is used to distinguish between monosacchride and disacchrides. 2 ml of Barford reagent (**Cupric acetate, acetic acid and water**) was added to 1 ml aqueous solution of drug and boil. Formation of brick red precipitate **يشبه لون الطوب الاحمر** in 5 minutes indicates presence of monosacchride while in 7 minutes indicates disaccharide.

Chemical test for Starch:

a- **Jelly test:** To 0.5 gm of starch in a test tube add 5 ml of **distilled water and boil on water bath**. Formation of translucent **شفاف** jelly indicates presence of starch.

b- **iodine test:** It is also known as iodine – KI reagent and composed of aqueous **Iodine solution** in presence of KI. Few drops of iodine – KI reagent was added to the aqueous solution of starch, which produces deep **blue to bluish black colour** due to presence of amylase. The colour developed **disappears on warming and reappears on cooling**. Starch amylopectin, disacchrides and cellulose do not produce any colour.

Gums and mucilage's:

They have similar constitutions and on hydrolysis yield a mixture of sugars and uronic acids(sugar **acids** with carboxylic **acid** functional groups).

Gums are considered to be pathological products formed upon injury of the plant or owing to un favorable conditions, such as drought **جفاف**, by a breakdown of cell walls (extracellular formation).

mucilages are generally normal products of metabolism formed within the cell (intracellular formation) and may represent storage material to protect the germination seeds يحمي بذور الانبات . They are often found in quantity in the cells of leaves, e.g. senna, in seed coats (linseed بذور الكتان, psyllium etc.), roots (marshmallow) and bark اللحاء (slippery elm).

Tragacanth

It is the air-hardened gummy exudate, تم تصلبه بواسطة الهواء , flowing naturally or obtained by incision, from the trunk جذع and branches of *Astragalus gummifer* and *Astragalus brachycalyx*. The genus (Leguminosae القرنية) contains some 2000 species and those that yield gum are thorny shrubs الشجيرات الشائكة

Formation. the gum exuding ينضح immediately after injury and performed in the plant and are gradually transformed into gum.

Collection. The mode of collection varies, but the following steps of collection :Gum can be obtained from the plants in their second year. The part of plant is incised يقطع . then open the incision so that the gum will exude more freely. The gum exudes is collected 2 days after the incision.

Characters. The gum is **white or very pale yellowish-white in colour**, translucent شفاف . It breaks with a short fracture, is **odorless** and has little taste. Tragacanth swells ينتفخ into a gelatinous mass when placed in water, but only a small portion dissolves.

On the addition of a dilute solution of **iodine** to a fragment previously soaked in water, relatively few **blue points** are visible

Constituents. Tragacanth consists of a **water-soluble** fraction known as **tragacanthin** and a *water-insoluble fraction known as bassorin*. Both are insoluble in alcohol. Tragacanthin and bassorin may be separated by ordinary filtration a dilute mucilage and the tragacanthin may be

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estimated by the evaporation of the filtrate. tragacanth is composed of sugar and uronic acid units. Among the products of hydrolysis galacturonic acid, d-galactopyranose, l-arabinofuranose and d-xylopyranose have been identified.

Uses. Tragacanth is used in pharmacy as a suspending agent for insoluble powders, etc., or as a binding agent in pills and tablets. It used as a topical treatment for burns. It is used in pharmaceuticals and as an emulsifier, thickener, stabilizer,